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EXAMINER	
PROCTOR, JASON SCOTT	
ART UNIT	PAPER NUMBER
2123	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/001,802	TRELL, ERIK Y.	
	Examiner	Art Unit	
	JASON PROCTOR	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 July 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 11-14 were rejected in the Office Action entered on 29 January 2009.

Applicants' response submitted on 29 July 2009 has amended claims 11 and 13-14; and presented new claim 15. Claims 11-15 are pending in this application.

Claims 11-15 are rejected.

Information Disclosure Statement

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Specifically, the specification makes reference to numerous publications throughout the specification (See: specification page. 8, "Jaffe (Nature, Vo. 268, p. 201, 1977", "(G. Rosner, Science, Vol. 290, 2000, p 2083)", for example) that have not been properly included in an IDS.

Response to Remarks - 35 USC § 101

2. The previous rejection of claims 11-14 are withdrawn in response to the amendments to the claim language.

Response to Remarks - 35 USC § 112

3. In response to the previous rejection of claim 14 under 35 U.S.C. § 112, first paragraph, Applicants argue primarily that:

> As noted holography is a mature art with many known techniques for forming and displaying holographic images. The PTO is specifically referred to USP 6,178,018 for evidence that it is known how to generate holograms with computers. It is submitted that one of ordinary skill in the art would have been aware of such techniques.

The Examiner has fully considered this argument and has found it persuasive. Applicants have persuasively argued that the limitations of claim 14, in particular, a "figurative representation [which is] holographic" is prior art. The steps necessary to make and/or use the claimed holographic physical representation would have been known or would have been available to a person of ordinary skill in the art at the time of Applicants' invention. The previous rejection of claim 14 under 35 U.S.C. § 112, first paragraph, is withdrawn.

Response to Remarks - 35 USC § 103

4. In response to the previous rejection of claim 11-14 under 35 U.S.C. § 103 as being obvious over Bogoliubov in view of Applicants' Own Admission, and further in view of "IRIS Explorer User's Guide" Release 5.0, Applicants argue primarily that:

> It is submitted that no only there is no reason to combine the references as proposed. [sic] The PTO admits that Boboliebov [sic] fails to teach on to create a graphical representation of the model of an elementary particle, and it would, therefore, be unobvious to use Boboliebov as a basis for doing so. Moreover, the proposed combination would not provide the claimed invention because the IRIS system could not be used in coordination with Boboliebov.

The Examiner respectfully traverses this argument as follows.

Regarding Applicants' first point, a statement of reasons to combine the references as proposed has been provided in the Office Action entered on 16 April 2007, the Office Action entered on 17 December 2007, and in the Office Action entered on 29 January 2009. The statement of reasons to combine the references is shown below.

Regarding Applicants' second point, the Examiner is unaware of any admission by the PTO that it would "be unobvious to use [Bogoliubov] as a basis for [creating a graphical representation of the model of an elementary particle]." The basis for Applicants' argument is unknown. Further, as Applicants are well aware, the claims have been rejected under 35 U.S.C.

§ 103 as being obvious over a combination of references. As Applicants are well aware, 35 U.S.C. § 103(a) states in relevant part:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Applicants' argument appears to suggest that Bogoliubov does not "identically disclose" the claimed invention, giving rise to "differences between the subject matter sought to be patented" and the single Bogoliubov reference. However, those differences are taught by Applicants' Own Admissions and the "IRIS Explorer User's Guide" Release 5.0. Therefore, there are no differences between the combined prior art and the subject matter of claims 11-15. The prior art pertains to analogous fields of technology and motivation to combine the references has been shown in this and the previous three Office Actions.

Regarding Applicants' third point, Applicants merely allege that the IRIS system could not be used with the teachings of Bogoliubov. This allegation is unpersuasive because Applicants have not demonstrated any factual basis to support the allegation.

Applicants' arguments have been fully considered but have been found unpersuasive. The previous rejections are maintained.

Upon secondary consideration of the claimed invention and the prior art of record, the Examiner has entered new grounds of rejection. Accordingly, this Office Action is NON-FINAL.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 11-14 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 11 recites the limitation "said ***physical or*** figurative representation of a ground state sphere" in line 11. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 12 recites the limitation "the incident spheroidal surface transformation rendering" in 5. There is insufficient antecedent basis for this limitation in the claim.

8. Claim 13 recites the limitation "the figurative representation" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. It is unclear whether this language refers to "a figurative representation of a ground state sphere of unit scale" or "a plurality of figurative representations of beams".

9. Claim 14 recites the limitation "the figurative representation" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. It is unclear whether this language refers to "a figurative representation of a ground state sphere of unit scale" or "a plurality of figurative representations of beams".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. § 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 11-12 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over US Patent No. 4,452,590 to Trell in view of Applicants' Admitted Prior Art.

Regarding claim 11, Trell discloses a method for constructing a model of the structures and properties of elementary particles in a physical medium from within, comprising:

providing a physical medium capable of providing a figurative representation of a ground state sphere of unit scale [*"A device of producing a model of Baryon states comprises a form permanent body divided into two halves along a plane interface and forming at least one cavity. This cavity is defined by a spheroidal transformation of a homomorphic Euclidean representation of an invariant gauge field symmetry of the Baryon, in a root vector lattice corresponding to the analytical symmetry of the three-dimensional, spherical 0 (3) Lie algebra."* (Trell, abstract); see FIG. 2a-2d],

providing in said physical medium a plurality of figurative representations of beams each of which is configured to be inserted in said figurative representation of a sphere according to the root space vectors of the SO(3) X O(5) Lie algebra coset decomposition of SU(3) [*"The primary objective of the invention is to provide such models and means by which the models can be produced in an easy and cheap way. This object is achieved according to the invention by*

providing a device of producing a model of Baryon states, comprising a form permanent body divided into two halves along a plane interface and forming at least one cavity defined by a spheroidal transformation of a homomorphic Euclidean representation of an invariant gauge field symmetry of the Baryon, in a root vector lattice corresponding to the analytical symmetry of the three-dimensional, spherical O(3) Lie algebra, said cavity having a symmetry plane in said interface." (Trell, column 2, lines 24-36)], and

inserting one or more of said figurative representations of said beams into said physical or figurative representation of a ground state sphere of unit scale according to the root space vectors of the SO(3) X O(5) Lie Algebra coset decomposition to provide said model [*"The $|L_{+1}|$ basis vector inclination then corresponds to the Q= +1, Proton state, while the $|L_0|$ basis vector inclination corresponds to the Q=0, Neutron state. Both represent Unit basis vector, spherical states (the slight mass difference will be briefly considered later). They may commute into each other through a negatively* [...] *or positively* [...] *oriented, Unit root vector interval over the surface of the representation sphere (FIG. 2-3). These Unit difference vectors, which are of the same length and inclinations as the root vectors of the algebra, may be identified as π- and π+ respectively. Similarly, a - $|L_0|$ straight Unit vector commutation, for instance, between the two forms of $|L_{+1}|$, may be identified as π^0 (FIG. 2b-d). Since the spherical O(3) root space contains only (the two varieties of) $|L_{+1}|$ and $|L_0|$ commuting with each other in the positive half of the diagram, there should be only two varieties of the positive-definite spherical Baryon bag ground state, corresponding to the Proton and the Neutron."* (Trell, column 11, lines 16-35)].

Further, Applicants admit the differences between the Trell patent and the present invention in the specification on page 4:

> The earlier United States Patent 4,452, 590, issued June 5, 1984, for the first time embodies a real three-dimensional model of Baryon states and a device of producing such models. However, it is important to emphasize that the said patent is (a) confined to the Baryon, i.e. does not model the Mesons, Leptons, Bosons etc. elementary particles, and(b) comprises a "form permanent body divided into two halves" where the deductively found outer shapes of a few basic varieties are obtained in an ad hoc way by the (c) concentric and (d) external casting of the respective unit volume-preserving shapes by this ruler or mould which hence applies the rind extrinsic transformations from without over (e) the whole particle encasement.

The presently claimed invention recites none of the differences noted in this paragraph.

Therefore, in light of the teachings of the Trell patent, and in light of Applicants' Admitted Prior Art, the claimed invention would have been at least obvious over the Trell patent.

Regarding claim 12, Trell discloses that transformations are retrieved and performed in any Cartesian space segment of said representation of a ground state sphere according to specified angle and length lattice chain recombination of said representations of said beams leading to coordinate settling of the incident spheroidal surface transformation rendering [*"Since all Lie algebras possess homomorphic, real Euclidean representations, it also seems plausible to search for Euclidean representations of the elementary particle symmetries as suggested by the bag model of the volumetric confinement of Baryons. O(3), the three-dimensional rotational group, is a volume-preserving (Det=1) continuous transformation group characterizing a three-dimensional, rotationally symmetric, real Euclidean space."* (Trell, column 3, lines 25-42)].

Further, Applicants admit the differences between the Trell patent and the present invention in the specification on page 4:

> The earlier United States Patent 4,452, 590, issued June 5, 1984, for the first time embodies a real three-dimensional model of Baryon states and a device of producing such models. However, it is important to emphasize that the said patent is (a) confined to the Baryon, i.e. does not model the Mesons, Leptons, Bosons etc. elementary particles, and(b) comprises a "form permanent body divided into two halves" where the deductively found outer shapes of a few basic varieties are obtained in an ad hoc way by the (c) concentric and (d) external casting of the respective unit volume-preserving shapes by this ruler or mould which hence applies the rind extrinsic transformations from without over (e) the whole particle encasement.

The presently claimed invention recites none of the differences noted in this paragraph.

Therefore, in light of the teachings of the Trell patent, and in light of Applicants' Admitted Prior Art, the claimed invention would have been at least obvious over the Trell patent.

Regarding claim 15, Trell discloses a method for constructing a model of the structures and properties of elementary particles in a physical medium from within, comprising:

providing a physical representation of a ground state sphere of unit scale [*"A device of producing a model of Baryon states comprises a form permanent body divided into two halves along a plane interface and forming at least one cavity. This cavity is defined by a spheroidal transformation of a homomorphic Euclidean representation of an invariant gauge field symmetry of the Baryon, in a root vector lattice corresponding to the analytical symmetry of the three-dimensional, spherical 0 (3) Lie algebra."* (Trell, abstract); see FIG. 2a-2d],

providing a plurality of physical representations of beams each of which is configured to be inserted in said physical representation of a sphere according to the root space vectors of the SO(3) X O(5) Lie algebra coset decomposition of SU(3) [*"The primary objective of the invention is to provide such models and means by which the models can be produced in an easy and cheap way. This object is achieved according to the invention by providing a device of producing a model of Baryon states, comprising a form permanent body divided into two halves along a plane interface and forming at least one cavity defined by a spheroidal transformation of a homomorphic Euclidean representation of an invariant gauge field symmetry of the Baryon, in a root vector lattice corresponding to the analytical symmetry of the three-dimensional, spherical O(3) Lie algebra, said cavity having a symmetry plane in said interface."* (Trell, column 2, lines 24-36)], and

inserting one or more of said physical representations of said beams into said physical representation of a ground state sphere of unit scale according to the root space vectors fo the SO(3) X O(5) Lie Algebra coset decomposition to provide said model [*"The $|L_{+1}|$ basis vector inclination then corresponds to the Q= +1, Proton state, while the $|L_0|$ basis vector inclination corresponds to the Q=0, Neutron state. Both represent Unit basis vector, spherical states (the slight mass difference will be briefly considered later). They may commute into each other through a negatively* [...] *or positively* [...] *oriented, Unit root vector interval over the surface of the representation sphere (FIG. 2-3). These Unit difference vectors, which are of the same length and inclinations as the root vectors of the algebra, may be identified as π- and π+ respectively. Similarly, a - $|L_0|$ straight Unit vector commutation, for instance, between the two forms of $|L_{+1}|$, may be identified as π^0 (FIG. 2b-d). Since the spherical O(3) root space contains only (the two varieties of) $|L_{+1}|$ and $|L_0|$ commuting with each other in the positive half of the diagram, there should be only two varieties of the positive-definite spherical Baryon bag ground state, corresponding to the Proton and the Neutron."* (Trell, column 11, lines 16-35)].

Further, Applicants admit the differences between the Trell patent and the present invention in the specification on page 4:

> The earlier United States Patent 4,452, 590, issued June 5, 1984, for the first time embodies a real three-dimensional model of Baryon states and a device of producing such models. However, it is important to emphasize that the said patent is (a) confined to the Baryon, i.e. does not model the Mesons, Leptons, Bosons etc. elementary particles, and(b) comprises a "form permanent body divided into two halves" where the deductively found outer shapes of a few basic varieties are obtained in an ad hoc way by the (c) concentric and (d) external casting of the respective unit volume-preserving shapes by this ruler or mould which hence applies the rind extrinsic transformations from without over (e) the whole particle encasement.

The presently claimed invention recites none of the differences noted in this paragraph.

Therefore, in light of the teachings of the Trell patent, and in light of Applicants' Admitted Prior Art, the claimed invention would have been at least obvious over the Trell patent.

11. Claim 13 is rejected under 35 U.S.C. §103(a) as being unpatentable over Trell in view of Applicants' Admitted Prior Art as applied to claim 11 above, and further in view of "Principles of Traditional Animation Applied to 3D Computer Animation" by John Lasseter et al. ("Lasseter").

Regarding claim 13, Lasseter teaches that the figurative representation is a computer animation [*"This paper describes the basic principles of traditional 2D hand drawn animation and their application to 3D computer animation."* (Lasseter, abstract)].

Lasseter and Trell are analogous art because both are drawn to creating representations of objects.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Lasseter and Trell as expressly motivated by Lasseter in order to produce better computer animations [*"Understanding these principles of traditional animation is essential to producing good computer animation. Such an understanding should also be important to the designers of the systems used by these animators."* (Lasseter, page 35, right column)]. The combination could be achieved by using the methods taught by Lasseter to create a computer animation of the "model" taught by Trell. The resulting animation would depict the model, in motion, in a familiar and easily understood medium.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Lasseter and Trell in order to arrive at the invention specified in claim 13.

12. Claim 14 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Trell in view of Applicants' Admitted Prior Art as applied to claim 11 above, and further in view of "Holographic Image Synthesis Utilizing Theoretical Methods" by James P. Waters.

Regarding claim 14, Waters teaches that the figurative representation is holographic [*"A theoretically calculated, automatically plotted, and photoreduced hologram has been successfully used to 'reconstruct' the image of a nonexistent, three-dimensional, equilateral tetrahedron. The theory, as presented therein, provides a synthetic hologram which consists only of completely opaque and transparent portions; allows reconstruction of the entire image with any fraction of the hologram as in conventional experimental types; can be made to reconstruct objects for either on- or off-axis viewing; provides both a real and virtual image; and produces a positive image with both positive and negative prints."* (Waters, abstract)].

Waters and Trell are analogous art because both are drawn to creating representations of objects.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Waters and Trell as expressly motivated by Waters in order to produce a representation that *"allows for reconstruction of the entire image with any fraction of the hologram as in conventional experimental types; can be made to reconstruct objects for either on- or off-axis viewing; provides both a real and virtual image; and produces a positive image with both positive and negative prints."* (Waters, abstract). The combination could be formed by following Waters method to create a synthetic hologram of the "model" taught by Trell. Waters describes that method (Waters, page 405, right column). The resulting hologram would depict a three-dimensional representation, allowing for inspection of

the model from various angles, while being stored on a two-dimensional, paper-like form. Thus the holographic representation could be stored with paper, or printed in a book, but still afford a level of three-dimensional display.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Waters and Trell to arrive at the invention specified in claim 14.

7. Claims 11-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over "Finite-size effects and infrared asymptotics of the correlation function in two dimensions", Bogoliubov et al, J. Phys. A: Math. Gen. 20, 1987, in view of applicants' own admission (AOA), and in further view of IRIS Explorer User's Guide" Release 5.0, The Numerical Algorithms Group, Ltd, 2000.

Regarding claims 11-15, Bogoliubov teaches a creating a model of elementary particles (Section 3, especially page 5365, paragraph 1) that includes ground states represented by filling a Fermi sphere (page 5363, paragraph 1).

Bogoliubov does not explicitly disclose the use of root space vectors and Lie algebra coset decomposition.

However, as admitted by applicants, and disclosed in the specification, the features relating to root space vectors and Lie algebra coset decomposition were well known in the art at the time of the invention. (See: page 5, last paragraph, page 6, paragraph 2 (Science, Rosner,

Vol. 290, 200, p 2083), page 7, paragraphs 2-4, page 8, paragraphs 1-3 (Nature, Jaffe, Vol. 268, p 201, 1977), for example)

Accordingly, a skilled artisan tasked with realizing a method and apparatus for producing a model of an elementary particle, and having access to the teachings of Bogoliubov and applicants admitted prior art, would have knowingly modified the teachings of Boboliubov with the admitted prior art to realized the elements of the present invention as presently claimed. An obvious motivation exists since, as recognized in applicants admitted prior art, it has already been established that coset decomposition algebra can be projected in real geometry. (See: page 5, last paragraph, Kleppner and Jackow)

Boboliebov and AOA do not explicitly disclose a creating graphical representation of the model of elementary particles. (e. g. representing the model of elementary particles in a figurative or physical medium)

IRIS Explorer discloses a commercially available software product capable of providing a visualization of (Section 1.6 to 1.6.2) of particle models (elementary, subatomic, etc.) generated by computer graphics. Hence, a skilled artisan would have further known to modify the teachings of Boboliebov and AOA with the teachings of IRIS Explorer as a method of providing a visual representation of the elementary particle model using the same reasoning previously set forth above. Here the examiner has interpreted a figurative or physical medium to be visual or graphical display of the elementary particles represented by the model.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (571) 272-3713. The examiner can normally be reached on 8:30 am-4:30 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jason Proctor/
Examiner
Art Unit 2123

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